

Case Study 221

Monitoring and Targeting in a hospital laundry



Information inputting – a straightforward task

Case Study Objective

To demonstrate how energy and cost savings can be achieved and maintained as a result of applying Monitoring and Targeting techniques to the energy consumption of a hospital laundry.

Potential Users

Larger National Health Service and commercial laundries.

Investment Cost

£1,000 (1991 prices) for the purchase, installation and setting-up of the programmed spreadsheet. All energy saving measures made during the first year were at no cost.

Savings Achieved

The net energy savings at the end of the first year of Monitoring and Targeting were 3,250 GJ/year worth £10,300. (1991 prices)

Payback Period

The simple payback period based on the rate of savings achieved was approximately three months.

Case Study Summary

A Monitoring and Targeting (M&T) technique, specifically developed for the fabric care industry by the British Textile Technology Group, was installed by the North Staffordshire Hospital (NHS) Trust District Laundry in May 1991.

The system consists of a flowline analysis program, based on a computer spreadsheet, customised for the laundry.

The total cost of £1,000 included the software, its customisation and installation. Once installed on the existing PC, it was ready for use straight away.

Prior to the installation of the M&T system, the steam consumption was on average

13.7% above the target. This Case Study shows how the system was used to assess the scope for making energy savings and maintaining them in the future.

The first year of system operation was studied in detail. After installation, steam savings of 5.1% were made almost immediately by isolating the supply to individual machines when they were not being used. Savings increased to 18.8% when the steam supply was isolated in the boiler house at the end of each working day. This level of saving was equivalent to a steam consumption 7.6% below the target level.

Host Organisation

District Laundry
North Staffordshire Hospital (NHS) Trust
Princes Road
Hartshill
Stoke-on-Trent
ST4 7LN

Monitoring Contractor

The Dyer Warner Partnership
Cliffe House
Church Hill
Birstall
Leicester
LE4 4DN
Tel: 0116 267 7017
Fax: 0116 267 3819
Mr M Roberts

Equipment Supplier

British Textile Technology Group
Shirley House
Didsbury
Manchester
M20 8RX
Tel: 0161 445 8141
Fax: 0161 434 9957
Mr P Whitaker

There are other suppliers of similar energy efficiency services in the market. Please consult your supply directories or contact ETSU who may be able to provide you with more details on request.



ENERGY EFFICIENCY

“The system readily demonstrates what can be achieved with a relatively small investment in time and money.”



Background

The North Staffordshire Hospital (NHS) Trust District Laundry provides a service to all the District Health Authority's hospitals and has a workload of approximately 100,000 pieces/week. In 1988, the laundry was refurbished and a heat recovery system was installed. The laundry is now equipped with a Voss tunnel washer and Kannegeisser single-stage press, two Spencer washer extractors, six Passat and two Cherry Tree tumble dryers, two 4-roll calenders, one Spencer air-lay, one Hoffmann press and one tunnel finisher.

Flowline Analysis

The Monitoring and Targeting (M&T) technique developed by the British Textile Technology Group is based on 'flowline analysis' using a programmed computer spreadsheet.

Flowline analysis is particularly applicable to larger laundries and is a practical means of determining the energy consumption of a 'category of work' as it progresses through each process from washing to final completion.

Every piece of work coming into the laundry is allocated to a work category. For each of these categories the processing route or 'flowline' through the laundry is identified.

A steam energy consumption for every process in each flowline is assigned, taking into account the equipment used, the temperatures achieved, cycle times, calender speeds and so on. These data were obtained by actual measurements on the equipment used, from calculations and from manufacturers' data.

The System Installed at the Laundry

During the first year the system was used to monitor and target steam consumption only, which accounted for approximately 92% and 79% of the laundry's energy consumption and energy cost respectively. The system was intended to target electricity and water at a later date.

For analysis, the work was divided into five sub-sections:

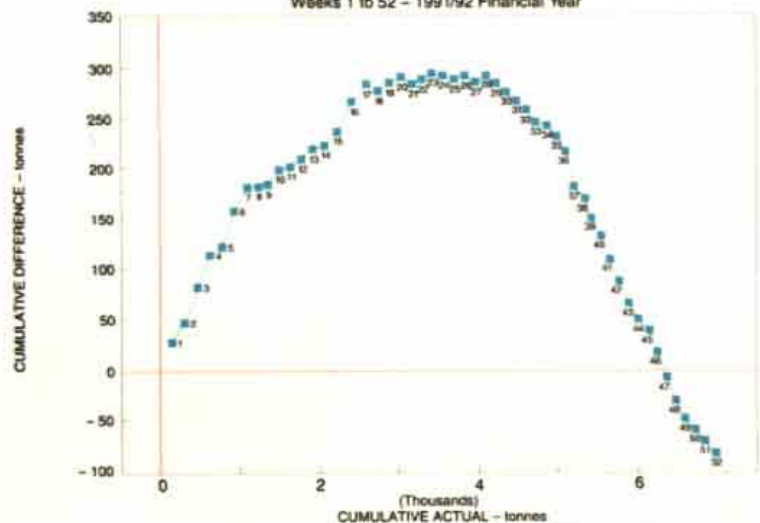
- **Fully Dried:**
26 categories including blankets, towels, dressing gowns and children's wear. All

are washed and then fully tumble dried; they do not go through any other finishing process.

- **Calendered:**
18 categories including sheets, pillowcases, tea towels, table-cloths and curtains. All are washed, partly tumble dried and then calendered.
- **Tunnel Finished:**
19 categories in total. Some, including pyjamas, night-dresses, shirts and trousers, are washed, partly tumble dried and then tunnel finished. Others, including nurses' uniforms, theatre and domestic garments, go straight from washing to the tunnel finisher.
- **Pressed:**
5 categories including catering jackets and trousers, cotton coats and overalls. All are washed, partly tumble dried and then pressed.
- **Miscellaneous:**
This is a single category section to cover any piece of work not otherwise listed. The steam usage is based on an item weighing 0.5 kg which is washed and fully tumble dried.

DISTRICT LAUNDRY – CUSUM STEAM

Weeks 1 to 52 – 1991/92 Financial Year



Cumulative Sum Deviation (CUSUM) graph – Steam usage

The system is operated by directly entering the weekly throughput of each work category into the spreadsheet. The target steam consumption is then calculated automatically. The system allows 40,000 kg of steam for heat losses and warm-up at the start of the working day (calculated from historical data). Since very little space heating is required in the laundry, no allowance was made for the number of degree days. Other figures entered onto the spreadsheet include the actual steam, electricity and water consumption of the laundry.

The Results

The spreadsheet provides the following data in each weekly column:

- actual steam consumption;
- target steam consumption;
- pieces of work processed;
- total weight of work processed;
- actual and target specific energy requirement (kg of steam/kg of work processed);
- CUSUM for steam in terms of cumulative difference (actual minus target steam consumption) and cumulative actual.



Washer extractor – isolating such equipment when not in use was very beneficial



Laundry staff at work – staff involvement was crucial

The CUSUM graph of steam usage is a plot of cumulative difference against cumulative actual for the 52 weeks of the 1991/92 financial year. The M&T system was installed in Week 6. In Week 8 the steam isolating valves to each individual machine were manually turned off at the end of each working day. This action reduced steam consumption by 5.1% but the CUSUM curve continued to rise, because consumption was still about 8% above target. From Week 17 the steam supply to the laundry was manually isolated at the boiler house when not required. The hospital central services had not isolated supply before, due to the possibility of steam leaks developing if seals dried out; however, it was felt that the resulting savings would more than outweigh any additional maintenance costs. Later, a pneumatically operated valve was fitted allowing direct control from the laundry.

The effect of these measures can be seen on the CUSUM steam usage graph in two stages. At first the curve goes horizontal indicating 'on target' consumption, and then the curve falls indicating steam consumption below target. During the latter part of the year consumption was running 18.8% below its level prior to the start of M&T and was 7.6% below the target level.

The Benefits of Monitoring and Targeting

The initial target setting exercise showed that considerably more steam was used by the laundry than was required to operate the process.

A critical examination of possible steam losses found that major savings could be made by:

- isolating the steam supply to each individual machine or piece of equipment when it was not actually required for production;



CUSUM graph – Steam savings

- isolating the main steam supply from the boiler house itself when the laundry was not operating.

The first of these measures was put into operation within a fortnight of the M&T system being installed and the second measure followed nine weeks later.

In addition to these two major changes, other actions carried out include:

- assessing the standard of lagging on the steam valves, flanges and flow and return pipework;
- examining the condition of steam traps;
- measuring the quantity of condensate returned;
- adjusting tumble dryer timings between winter and summer.

The weekly update of the CUSUM graph enables an immediate visual check to be made of steam usage in relation to workload. Improvements are shown by the CUSUM slope turning downwards. A sudden upward change might indicate a major problem, whereas a very slight upward change continuing over several weeks could indicate a problem with routine or planned maintenance schedules. In either case, management can be alerted immediately and action can be taken if necessary.

Weekly values for both actual and target steam consumption are also plotted. The target steam consumption varies depending on the mix and number of pieces going through the laundry each week.

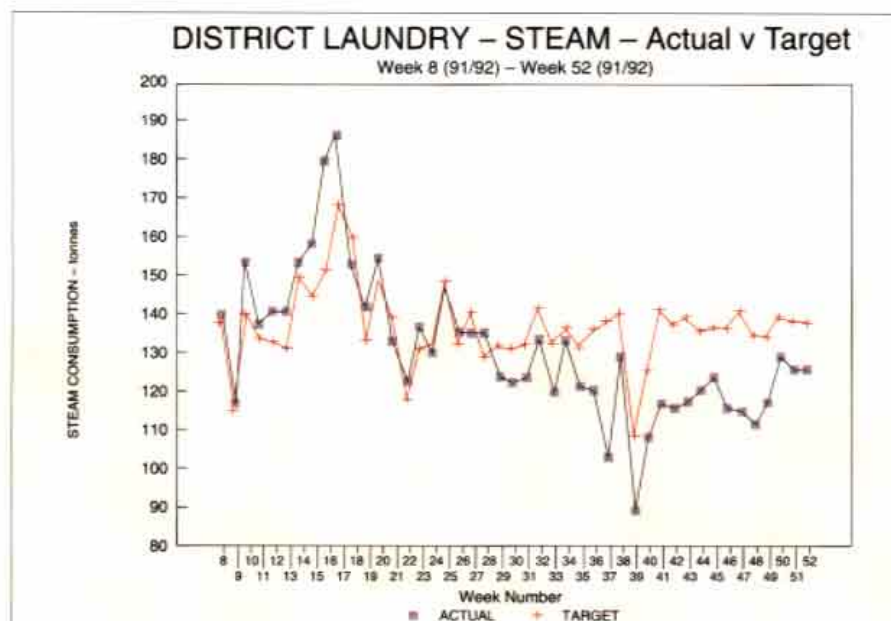
Financial Savings

The CUSUM steam saving graph shows the amount of steam saved following installation of the M&T system. (This start date was selected, because in the six months prior to installation, the laundry used 13.7% more steam than the target would have been.)

The graph shows that in the 45 weeks to the end of the 1991/92 financial year, 1,100 tonnes of steam were saved worth £9,000 (1991 prices). This is equivalent to a full-year saving of about 1,270 tonnes worth £10,300, or an energy saving of about 4,250 GJ gross of natural gas.

Future Prospects

Although this case study only considers the first year of operation, further opportunities for savings are being examined. For example, the continuing trend from 100% cotton to poly-cotton mixtures has recently enabled the temperature of the calender rolls to be reduced. The steam pressure has been dropped from 110 psig to 80 psig with a consequent reduction in consumption. Tests have indicated that the complete elimination of 100% cotton articles would allow the pressure to be reduced to 70 psig.



Weekly steam consumption

Comments from the North Staffordshire Hospital (NHS) Trust District Laundry

The Monitoring and Targeting system installed in the District Laundry has proved to be an excellent investment. Prior to its utilisation, we had been satisfied that our energy usage fell within the overall industry 'norms'.

Once installed and in use, the system allowed a comparison of actual usage and that which we should have been achieving, given the energy recovery systems that were in place. This comparison was very enlightening, even alarming, and provided the initial impetus to examine what we were doing and how we were doing it!

The graphs produced strengthened the department's hand in discussions with colleagues to resolve some issues. More significantly, we were able to measure and observe the effects of changes that were put into place as they occurred.

The Monitoring and Targeting system has proved to be an excellent motivator for management and staff, in avoiding waste and achieving savings. The system readily demonstrates what can be achieved with a relatively small investment in time and money.



E. A. Eve

Mr E Eve
Linen Services Manager
North Staffordshire Hospital (NHS) Trust



View of the laundry – North Staffordshire Hospital

North Staffordshire Hospital (NHS) Trust District Laundry

The Laundry currently processes a workload of over 100,000 pieces per week. As well as providing a service for all the District Health Authority hospitals it now also undertakes commercial contracts. The laundry operates for eight hours per day five days per week and buys its steam, electricity and water from the hospital central services.

The Department of the Environment, Transport and the Regions' Energy Efficiency Best Practice Programme provides impartial, authoritative information on energy efficiency techniques and technologies in industry, transport and buildings. This information is disseminated through publications, videos and software, together with seminars, workshops and other events. Publications within the Best Practice Programme are shown opposite.

Further information

For buildings-related topics please contact:
Enquiries Bureau

BRECSU

Building Research Establishment
Garston, Watford, WD2 7JR
Tel 01923 664258
Fax 01923 664787
E-mail brecsuenq@bre.co.uk

For industrial and transport topics please contact:
Energy Efficiency Enquiries Bureau

ETSU

Harwell, Didcot, Oxfordshire,
OX11 0RA
Tel 01235 436747
Fax 01235 433066
E-mail etsuenq@aeat.co.uk

Energy Consumption Guides: compare energy use in specific processes, operations, plant and building types.

Good Practice: promotes proven energy efficient techniques through Guides and Case Studies.

New Practice: monitors first commercial applications of new energy efficiency measures.

Future Practice: reports on joint R & D ventures into new energy efficiency measures.

General Information: describes concepts and approaches yet to be fully established as good practice.

Fuel Efficiency Booklets: give detailed information on specific technologies and techniques.

Energy Efficiency in Buildings: helps new energy managers understand the use and costs of heating, lighting etc.